Perceptual and Motor Skills, 2002, 95, 555-558. © Perceptual and Motor Skills 2002

RANKING OF STIMULI THAT EVOKED MEMORIES IN SIGNIFICANT OTHERS AFTER EXPOSURE TO CIRCUMCEREBRAL MAGNETIC FIELDS: CORRELATIONS WITH AMBIENT GEOMAGNETIC ACTIVITY[1]

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Summary.—To identify means to enhance the laboratory production of alleged paranormal phenomena, 15 pairs of men and women involved emotionally were tested by male and female experimenters who were not familiar with the hypothesis that ambient (geomagnetic) activity could modulate this production. While the female of the pair was exposed to six different patterns of complex magnetic fields designed to affect states of consciousness, the male wrote his reminiscences about shared experiences evoked by a postcard randomly selected from a collection of five. Increased global geomagnetic activity (k values between 0 and 5) at the time of the experiments was significantly and moderately correlated with the more accurate ranking of the stimulus cards. These results were similar to those of a previous study. We suggest that alleged paranormal phenomena involve processes that might be produced by experimentally altering the electroencephalographic correlates of consciousness with circumcerebral applications of counterclockwise weak magnetic fields. However, these processes may be enhanced if global geomagnetic activity is increasing during the periods of exposure.

Phenomena attributed to so-called "telepathy" can be more palatably described as a significant correlation between specific components of the behavior of a stimulus person and of a response person. The correlation does not represent causation and could involve a third factor producing both. We contend that terms such as "telepathy" or "clairvoyance" are equivalent to the role of "phlogiston" in alchemy before the existence and the role of oxygen were discovered. Both "telepathy" and phlogiston" were hypothetical constructs for erroneous or fictitious processes attributed to natural phenomena.

Persinger, Cook, and Tiller (2002) had found that many of the experiences of the response person, while exposed to specific patterns of magnetic fields designed to affect a specific state of consciousness (Cook, Koren, & Persinger, 1999; Richards, Koren, & Persinger, in press), were similar to the reminiscences (memories) of another (stimulus) person evoked by a randomly drawn pictorial stimulus. In addition, the concordance between the responses of the pairs of people, as judged by blind raters, was positively correlated with the amount of global geomagnetic activity at the time of the

[1]This research was supported by a grant from Fellowship Grant 71/00 from the BIAL Foundation (Portugal). Please send reprint requests to Dr. M. A. Persinger, Behavioral Neuroscience Laboratory, Department of Psychology, Laurentian University, Sudbury, ON, Canada P3E 2C6.

experiment. Global geomagnetic activity normally involves variations in amplitudes between 1 nanoTesla (nT) and about 100 nT over periods of 1 min. to tens of minutes. This variation is less than 1% of the intensity of the earth's static magnetic field and is primarily produced by changes in the velocity and density of the solar wind or interplanetary magnetic field.

The present study was designed to test the generalizability of the results of the previous study by employing more discrete responses by people who were not related genetically. A total of 15 pairs of university men and women who were enrolled in a first-year psychology course volunteered as subjects. Thirteen pairs had been dating for more than 2 months while two of the pairs had been married for more than 10 years. They were tested between 1900 and 2000 hr. on 15 separate days during February and March, 2002. The first and second authors, who were not aware of the hypotheses, tested the subjects. Because women are predominately the "experients" or response persons in spontaneous cases (Persinger, 1974), all of the women served as the "response" persons and sat blind-folded within a closed acoustic chamber room that was also a Faraday Cage.

Six different patterns of weak (microTesla) circumcerebral magnetic fields were presented sequentially through eight solenoids for 5 min. in a counterclockwise direction around the scalp (Cook, *et al.*, 1999). The arrangement was like a crown above the ears and around the head. The shapes, rotations, and rates of change in the presentation of the fields were controlled by computer. The subject (response person) exposed to the fields was asked to maintain an ongoing narrative of what she thought her male counterpart (stimulus person) was thinking. The narrative for each person was transcribed by the first author.

During the first 15 min. (first three burst-firing magnetic patterns, known to produce minimal imagery and accuracy), the female experimenter engaged in friendly discussions with the male of the couple. Both sat in another room separated by two doors and a wall from the room in which the acoustic chamber containing the response person was housed. During the second 15-min. period, when the frequency-modulated patterns were generated around the scalps of the field-exposed subjects, the male subjects were instructed to select randomly one of five manila envelopes each containing a picture postcard of a different local landmark. The postcards had been selected to have the greatest difference in color, content, and affective theme. Each man was asked to write the shared memories between himself and his female counterpart and to imagine what she might think about if she saw the picture.

At the end of the session, the five pictures (still placed in their envelopes and arranged in a randomly ordered stack) were taken by the female experimenter and given to the male experimenter (who never saw which picture had been selected). He placed the stack of envelopes on a small chair in

front of the response person (still seated in the chamber) who was asked to remove carefully each stimulus from the envelope, look at each stimulus first, and then rank them from most to least like their experiences during the experiment. The response person was informed the stimulus picture had been randomly selected and was not the choice of the stimulus person. A score of 1 indicated the first choice was the stimulus picture while a 5 indicated the stimulus picture was the last choice. The mean and standard deviation for the ranks for the 15 pairs of subjects were 3.2 and 1.2, respectively.

Typed narratives identified as either letters or numbers from five response persons during the fifth 5-min. pattern and their five stimulus persons, selected from the middle of the test series, were given by the third author to a class of 30 university students (not involved with the experiment) who were enrolled in a first-year psychology course. The response persons' narratives from the fifth pattern, which was the frequency-modulated field with a derivative of change of 20 msec., was selected because the congruence between narratives of the stimulus and response persons was greatest in the previous study (Persinger, *et al.*, 2002). The students in the class were told the randomly ordered five stimulus and five response narratives were five pairs of people in a clinical setting. Their task was to pair the response narrative with the appropriate stimulus narrative to discern which couples were most compatible because of shared emotions and memories. The numbers of pairs that were accurately matched were counted.

Geomagnetic data were obtained from *Recent solar and geomagnetic data* (http://www.dxlc.com/solar/indices.html). The global 24-hr. geomagnetic activity ($M = 9.4$, $SD = 10.8$, range 4–47 nT) was not correlated (*rho* = .03) with the ranks or the numbers of students who accurately identified the appropriate pair of narratives. The planetary k-values (recorded range in parentheses) for the 3-hr. (UTC) intervals 18–21 hr. (1–4), 21–24 hr. (1–3), 00–03 hr. (1–5), 03 to 06 hr. (0–5), and 06 to 09 hr. (0–3) were also obtained. Local time was .5 hr. earlier. These 3-hr. values are a series of integers (between 0 and 9) that reflect a quasilog value of the maximum deviation, in nT, of the most disturbed horizontal component of the geomagnetic field from quiet conditions. All statistical analysis involved SPSS software.

Spearman *rho* correlations between the ranks of the pictures by the response persons and the kp values for these intervals were .38, –.42, –.48 ($p < .05$), –.67 ($p < .01$), and –.40, respectively. Interestingly these correlations for the 13 pairs tested before the geomagnetic storm of 24 March (the only time during the experiment testing when the geomagnetic activity met the criteria of a "storm") were –.42, –.63 ($p < .01$), –.64 ($p < .01$), –.85 ($p < .001$), and –.42, respectively. The intervals with the significant correlations were equivalent to local time 19 hr. to 22 hr. (the interval of the experiments) and 22 hr. to 01 hr.

There was no statistically significant correlation between the ranks and the serial order of testing (*rho* = .20) for the 15 couples. When the daily 24-hr. aa values were first covaried, the first-order correlations between the ranks and the kp values for the successive 3-hr. intervals were –.36, –.42, –.43, –.60 ($p < .01$), and –.38, respectively (all dfs = 12). The rank order (Spearman *rho*) correlations between the numbers of accurate matches by the raters (not involved with the experiment directly) in the first-year class for each of the five narrative pairs and kp indices for the successive 3-hr. intervals on the days of the experiments were –.54, .65, .89 ($p < .02$), .68, and .75, respectively. The numbers of students (of 30) who correctly matched each of the five pairs of stimulus and response narratives ranged between 13 and 23 ($M = 17$).

These results are similar to those found by Persinger, *et al.* (2002) for congruence between narrative content of the stimulus and response person. Like the previous studies the greatest qualitative and quantitative correspondence between the reminiscences of the stimulus person and the content of the narrative experiences of the response person occurred during the specific, experimentally generated magnetic field configuration. This same configuration produced the greatest alteration in power spectra within a portion of the theta range wherein second derivatives of differences in periods between two successive cerebral waves (phase-modulations) might be nested (Persinger, 1999). This approach to understanding the properties of human experience would be congruent with the concept that the brain's electromagnetic field is the seat of consciousness (McFadden, 2002), and interactions with other very complex magnetic fields displaying the critical temporal parameters may contribute to the information generated within the volume of the cerebral tensor.

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Accepted August 7, 2002.